

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1-17. (Canceled).

18. (Currently Amended) A method of controlling a system to optimize an objective function thereof, the system being capable of performing a plurality of candidate actions and being capable of monitoring response performances of a performance of a respective candidate action, the method comprising the steps of:

a) monitoring response performance of a respective candidate action that is chosen to be performed;

b) storing, according to candidate action performed, a representation of said monitored response performance;

c) choosing which of the plurality of candidate actions is next performed so as to optimize said objective function by assessing, using the probability distribution of the response performance of all of said plurality of candidate actions, which candidate action is estimated to result in the lowest expected growth in regret after the chosen candidate action is performed; and

d) repeating steps a) to c) to substantially optimize the objective function of the system;

~~where regret is a term used for the shortfall in response performance between always performing the true best candidate action and actually performing the candidate actions chosen to be performed that represents a system performance measure that considers the~~
relative merit of exploration of one or more apparently non-best candidate actions, with respect to the relative merit of exploiting what appears to be the current best candidate action based on historical response performances to date.

19. (Previously presented) A method according to claim 18 wherein step c) includes assessing which candidate action is likely to result in the lowest expected growth in regret on the basis of a true best candidate action which has the mean of said probability distribution.

20. (Previously presented) A method according to claim 18 wherein step c) includes evaluating the cost or losses associated with presenting a lower performing candidate action and the gain or benefit associated with knowing the true position of the current best observed candidate action on said probability distribution.

21. (Previously presented) A method according to claim 20 wherein step c) includes assessing which candidate action is likely to result in the lowest expected growth in regret according to an assumption that the current best observed candidate action is assumed to have zero uncertainty around its mean or expected response performance.

22. (Previously presented) A method according to claim 18 wherein step c) includes assessing which candidate action is likely to result in the lowest expected growth in regret according to an assumption of a Student's distribution and evaluation of Student's t parameters as the basis for estimating probabilities of unequal or equal response states between the candidate action with the current expected best response performance and any other candidate action.

23. (Currently Amended) A method according to claim 18 wherein step c) includes using a Monte Carlo algorithm to provide understanding of the probability distribution of the response performance of all of the plurality of candidate actions and either ~~chooses~~ choosing the candidate action that contributes most to an ~~the~~ expected regret estimate, or ~~chooses~~ choosing a candidate action with probability proportional to its contribution to the expected regret estimate.

24. (Currently Amended) A method according to claim 18 further comprising the step of:

~~d)~~ e) applying a temporal depreciation factor to the stored representations of the response performance in order to depreciate the significance of the stored representations over time.

25. (Currently Amended) A method according to claim 24 wherein step ~~d~~) e) includes applying, for each candidate action, a different temporal depreciation factor to the stored representations of the response performance thereof.

26. (Previously presented) A method according to claim 18 further comprising the step of:

e) forcing the performance of each candidate action a minimum number of times or at a minimum rate.

27. (Previously presented) A method of controlling a system according to claim 18 wherein the system comprises a robot.

28. (Previously presented) A method of controlling a system having two or more ranks of control arranged in a hierarchy, wherein each rank of control has a respective objective function and is capable of performing a plurality of candidate actions for that rank of control in the hierarchy, wherein the candidate action of a rank of control can represent a lower rank of control in the hierarchy, the method comprising controlling said rank of control according to the steps of the method of claim 18.

29. (Previously presented) A method according to claim 28 wherein representations of said monitored response performance stored in step b) are shared with said rank of control.

30. (Previously presented) A method according to claim 18 wherein the monitored response performance of a respective candidate action in step a) is stored in step b) in a form to enable sharing of the stored representation of said monitored response performance with another system.

31. (Previously presented) A system controlled according to the method of claim 18.

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32. (Previously presented) A robot controlled according to the method of claim 18.

33. (Previously presented) A control apparatus operating according to the method of claim 18 to control a system.